

## The Penis — A Possible Alternative Emergency Venous Access For Males?

*For male patients in whom no other immediate venous channel is available, the intrapenile route may represent a life-saving alternative. Acute injection of fluid into corpora cavernosa was used to produce penile erection. With this simple injection technique, a high volume of fluid can be injected in a short time. Among 33 patients, only one was noted to have minor subcutaneous hematoma. The use of the intrapenile route of venous access is suggested for patients with severe hypovolemic shock. The principal advantage of the proposed method of venous injection is that it could represent a high-volume venous access system and is independent of the patient's volemic condition. [Godec C], Cass AS: The penis — A possible alternative emergency venous access for males? Ann Emerg Med 11:266-268, May 1982.]*

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### INTRODUCTION

Successful resuscitation of patients during hypovolemic shock requires rapid venous access for massive intravenous fluid infusion. Peripheral vein cutdown, internal jugular vein, subclavian vein, and femoral vein are routes of choice for high-volume venous access.

We suggest the use of cannulization of one of the corpora cavernosa of the penis as a route for short-term massive fluid administration. This method has been used to produce acute erection in the evaluation of impotence, but could possibly be used as an acute venous channel when other standard venous accesses are not available.

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### METHODS

During the evaluation of patients with erectile impotence, an artificial erection is produced acutely. A tourniquet is placed at the base of the penis, thus preventing outflow from the penis. Normal 0.9% solution of sodium chloride is injected into one of the corpora through a 19-gauge scalp vein needle (Figure 1). No heparin is added. The pressure inside corpora cavernosa and the changes in penile circumference are recorded simultaneously. The multiple vascular communications between the two corpora cavernosa make it possible to fill both corpora with a single needle (Figure 2). The amount of saline injected is recorded. The maximum filling of corpora is monitored, and at this point the tourniquet is released and the time between the release of tourniquet and return of pressure and tumescence to the preinjection level is recorded. This time represents drainage time of the fluid injected from corpora cavernosa into the penile venous system.

### RESULTS

In 33 patients, acute erection was produced by injecting normal saline into corpus cavernosum penis. The amount of injected fluid ranged from 12 cc to 115 cc, with an average injection volume of 43 cc. The drainage time from corpora cavernosa was recorded in 10 patients. The amount drained in the first two to four seconds ranged from 27% to 85%, with an average of 56%. The average peak drainage per second was 13.4 cc per second, with a range of 4 cc to 22 cc per second. There was no serious complication due to injection. The drainage was considered complete when the monitoring of penile tumescence displayed preinjection value.

**Fig. 1.** Intracavernosal application of fluid producing erection.

**Fig. 2.** Penile cavernosogram: both corpora are filled with contrast.

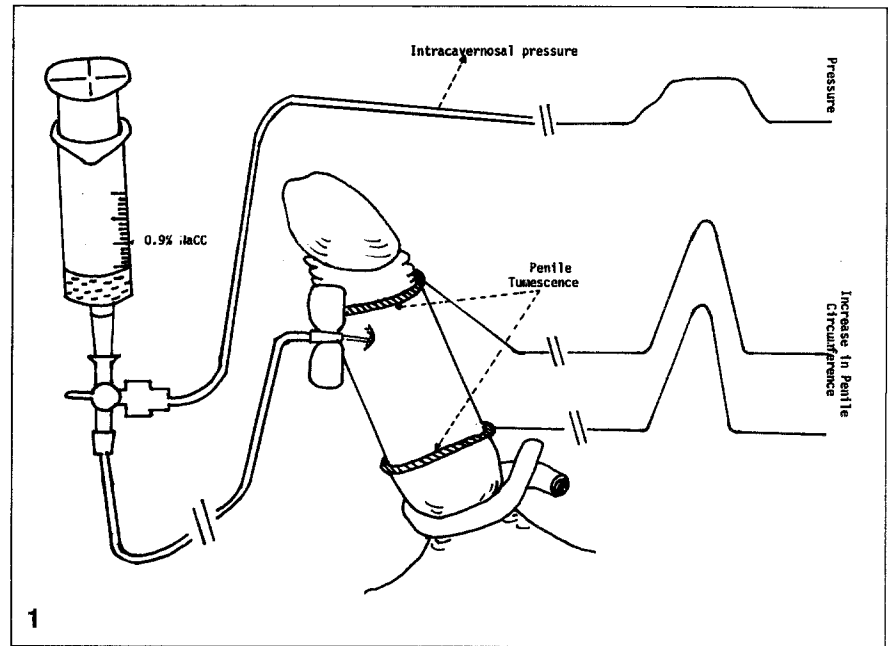
In only one patient, we noted subcutaneous hematoma which resolved the next day. Patients did not report any particular pain.

## DISCUSSION

The peripheral vein cutdown is used primarily when intact superficial veins are no longer available for needle puncture in the course of prolonged hospitalization. Septic cutdown is not infrequent, ranging from local suppuration and phlebitis to systemic infection. Infections are more likely to occur with catheters left in place for more than 48 hours.<sup>1,2</sup> The incidence of septicemia increases directly with the length of time the catheters remain *in situ*.<sup>3</sup>

Subclavian vein catheterization can trigger pneumothorax or hydrothorax.<sup>4,5</sup> Thrombophlebitis, subclavian artery injury, arteriovenous fistula formation, wound infection, hematoma at the venipuncture site, and infection of hematomas have been reported.<sup>4-6</sup> In addition, brachial plexus injury was reported<sup>7</sup> following subclavian catheterization. Subclavian catheter malposition was found in 22.5% of 2,467 patients in Mathias's series.<sup>7</sup> A case of lethal air embolism following subclavian catheterization was reported by Flanagan et al<sup>8</sup> in spite of Defalque's<sup>9</sup> conjecture that significant air embolism was not possible. Due to these complications, some<sup>10</sup> have suggested abandonment of the subclavian central venous approach five years after its introduction. Nevertheless the recent technical advances producing less thrombogenic catheters, the use of sterile techniques of catheter insertion, improved wound care, the use of closed infusion systems, and improved solutions for intravenous infusions have recently decreased the complications following subclavian catheterization.

Femoral venous access has been reported<sup>11</sup> as a good route for short-term massive fluid administration required during resuscitative attempts after cardiopulmonary arrest or extreme circulatory collapse. Use of the femoral vein was less frequently considered due to possible infective and thromboembolic complications.<sup>12,13</sup>



The femoral vein can be used successfully if the venous catheter is removed within 72 hours of placement.<sup>11</sup> Percutaneous femoral vein catheterization is not without danger. Inadvertent puncture of the femoral artery resulted in a periarterial hematoma,<sup>14</sup> femoral vein thrombosis, and retroperitoneal bleeding.<sup>15</sup> AV fistula after femoral vein catheterization has been described as well.<sup>16</sup>

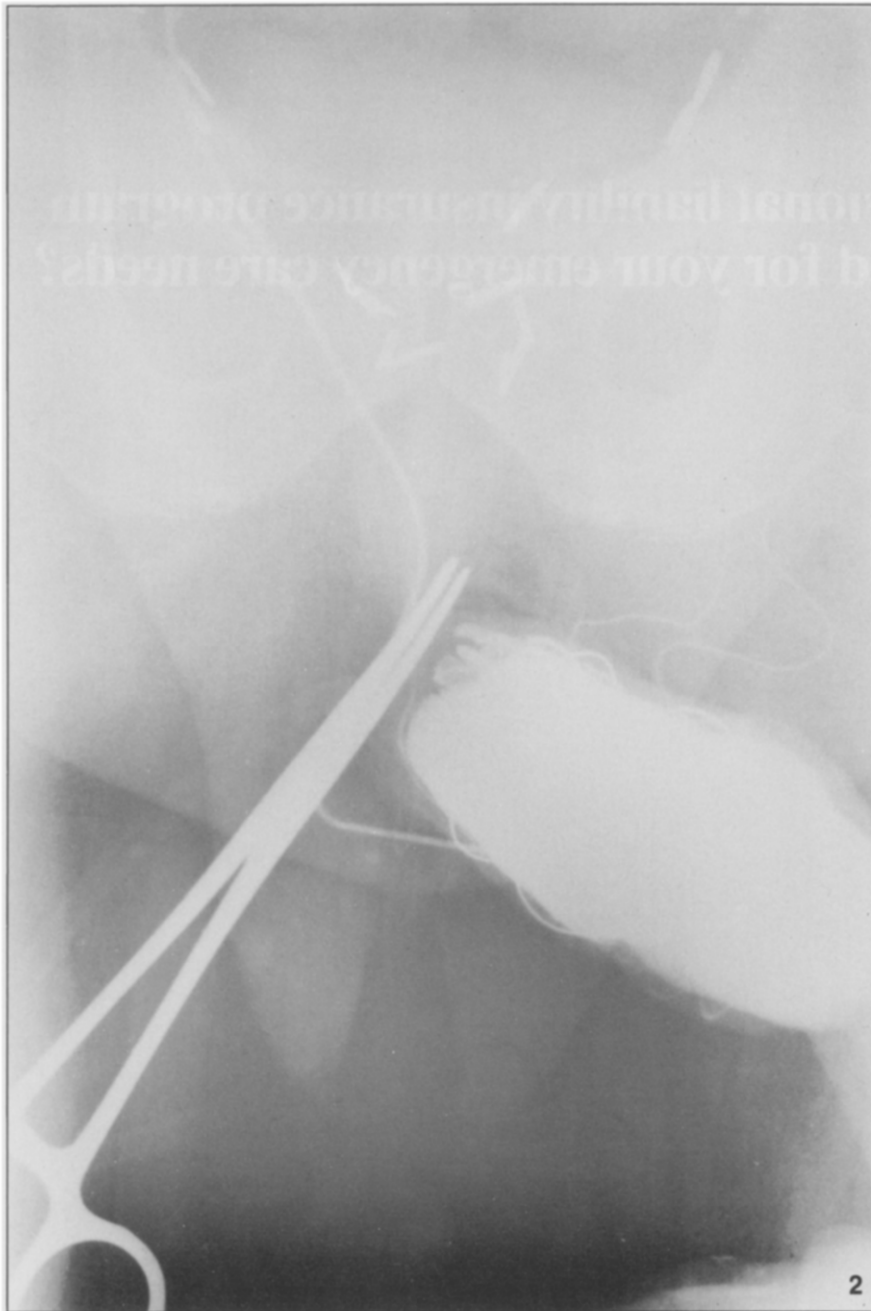
Internal jugular vein cannulization using a polyethylene catheter was first described by Hermosura et al.<sup>16</sup> English et al<sup>17</sup> described 200 jugular vein cannulations without major complications. The internal jugular vein has a distinct advantage over the subclavian and femoral veins due to its easy accessibility from the head of the operating table during surgery.<sup>18</sup>

The venous drainage of the penis has a dual arrangement. The superficial drainage from the skin returns through the superficial dorsal vein of the penis, which empties into the saphenous vein as the superficial external pudendal vein of the abdomen. The deep veins are the final tributaries emerging from erectile tissue to form the deep dorsal vein, which passes beneath Buck's fascia anterior to the urogenital diaphragm and empties into the plexus of Santorini and continues to the hypogastric vein. The deep drainage system is abundant and can drain a great volume in a short

time.<sup>19</sup> The many communications between the superficial and the deep system further increase the drainage capacity from corpora cavernosa.

The penile venous access offers certain advantages. It is always available in a male, regardless of the patient's volemic condition. There is no need for venous cutdown, and it represents high capacity drainage.<sup>20</sup> Abundant venous drainage from corpora cavernosa and their quick communication with major venous pathways represent the favorable anatomic structure for quick access of fluid to vascular space. Because our experience is limited to patients with erectile impotence, we can only speculate that this venous access could be used when a rapid, high volume of fluid must be applied in an emergency situation. It does not require particular skill. Tunica albuginea enveloping corpora cavernosa is the strongest fascia in the human body. Therefore, when the inserting needle penetrates this thick fascia, a distinct "click" can be felt which indicates the correct position of the needle. The complication rate for producing an acute erection is low. The method did not cause much discomfort; the amount of discomfort was compared to that of injecting a peripheral vein.

The use of penile access for chronic intravenous application should be explored as well. It is likely this method



is not suitable for chronic application, but could be used as an emergency resuscitative measure. The principal disadvantage of this method is its limitation to males only.

The high-pressure system used for intracorporeal injection is not transmitted directly into the venous system because the corpora cavernosa's spongy tissue serves as a buffer that converts the higher pressure inflow into a low pressure in the numerous venous channels leaving corpora cavernosa.

### CONCLUSION

In male patients with severe hypovolemic shock when no other immediate venous channel is available, the intrapenile route may represent a useful alternative. Although we have not used this method in emergency situations, we speculate that it could be considered as an easily accessible venous channel allowing effective resuscitation.

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